

In re Application of

STEVEN GAMBLIN

Application No.: Not yet assigned

Filed: May 27, 2005

Based on International Appl. No. PCT/GB2003/005158

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**In the Claims**

Please amend claims 3-8, 10-43 and 45-46 as set forth below.

Please cancel claim 44 without prejudice.

Please add new claim 47 as presented below.

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Original) A crystal comprising a pRb/E2F<sub>(409-426)</sub> complex, wherein the crystal structure is characterised by the atomic co-ordinates of Annex 1.
  
2. (Original) A crystal as claimed in claim 1, wherein the interactions between E2F<sub>(409-426)</sub> and pRb comprise one or more of the following interactions:

E2F <sub>(409-426)</sub> residue	pRb residue
Leu <sub>409</sub>	Lys <sub>548</sub>
Tyr <sub>411</sub>	Glu <sub>551</sub>
Tyr <sub>411</sub>	Ile <sub>532</sub>
Tyr <sub>411</sub>	Glu <sub>554</sub>
His <sub>412</sub>	Arg <sub>656</sub>
His <sub>412</sub>	Lys <sub>653</sub>
Gly <sub>414</sub>	Glu <sub>533</sub>
Gly <sub>414</sub>	Lys <sub>652</sub>
Leu <sub>415</sub>	Leu <sub>649</sub>
Leu <sub>415</sub>	Glu <sub>553</sub>
Leu <sub>415</sub>	Lys <sub>537</sub>
Glu <sub>417</sub>	Lys <sub>537</sub>
Gly <sub>418</sub>	Arg <sub>467</sub>
Glu <sub>419</sub>	Thr <sub>645</sub>

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Arg <sub>422</sub>	Glu <sub>464</sub>
Asp <sub>423</sub>	Arg <sub>467</sub>
Leu <sub>424</sub>	Lys <sub>530</sub>
Phe <sub>425</sub>	Phe <sub>482</sub>
Phe <sub>425</sub>	Lys <sub>475</sub>

3. (Currently Amended) A method ~~to identify~~ of identifying an agent which modulates the interaction between pRb and E2F<sub>(409-426)</sub>, ~~the method~~ comprising:
  - a) combining ~~together~~ pRb, E2F<sub>(409-426)</sub> and an agent, under conditions in which pRb and E2F<sub>(409-426)</sub> form a complex;
  - b) growing a crystal structure of any pRb/ E2F<sub>(409-426)</sub> complex; and
  - c) ~~analysing~~ analyzing the crystal to determine whether the agent ~~is an agent~~ which modulates the interaction between pRb and E2F<sub>(409-426)</sub>.
4. (Currently Amended) [[A]] ~~The method~~ as claimed in ~~of~~ claim 3, wherein ~~the combining of the components is~~ pRb is combined with the agent and ~~then~~ E2F<sub>(409-426)</sub> is subsequently added.
5. (Currently Amended) [[A]] ~~The method~~ as claimed in ~~of~~ claim 3, wherein ~~the combining of the components is~~ E2F<sub>(409-426)</sub> is combined with the agent and ~~then~~ pRb is subsequently added.
6. (Currently Amended) [[A]] ~~The method~~ as claimed in ~~of~~ claim 3, wherein ~~the combining of the components is~~ pRb is combined with E2F<sub>(409-426)</sub> and ~~then~~ the agent is subsequently added.

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7. (Currently Amended) [[A]] ~~The method as claimed in any one of claim[[s]] 3 to 6,~~  
wherein step c) comprises comparing the crystal structure to the crystal structure of  
~~claim 4 characterized by the atomic co-ordinates of Annex 1.~~
8. (Currently Amended) [[A]] ~~The method as claimed in any one of claim[[s]] 3 to 7,~~  
wherein the agent is selected using the three dimensional atomic co-ordinates of  
Annex 1.
9. (Original) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub>  
complex, comprising selecting an agent using the three-dimensional atomic  
coordinates of Annex 1.
10. (Currently Amended) [[A]] ~~The method as claimed in of claim 9, wherein said~~  
~~selection selecting~~ is performed in conjunction with computer modeling.
11. (Currently Amended) [[A]] ~~The method as claimed in of claim 9 or 10, wherein the~~  
~~method further comprises comprising~~ the steps of:
  - a) contacting the selected agent with pRb and E2F<sub>(409-426)</sub> under conditions in  
which pRb and E2F<sub>(409-426)</sub> can form a complex; and
  - b) measuring the binding affinity of pRb to E2F<sub>(409-426)</sub> in the presence of the  
agent and comparing the binding affinity to that of pRb to E2F<sub>(409-426)</sub> when in  
the absence of the agent, wherein an agent modulates a pRb/E2F<sub>(409-426)</sub>  
complex when there is a change in the binding affinity of pRb to E2F<sub>(409-426)</sub>  
when in the presence of the agent.
12. (Currently Amended) [[A]] ~~The method as claimed in of claim 11, wherein the~~  
~~method further comprising:~~

- a) growing a supplementary crystal from a solution containing pRb and E2F<sub>(409-426)</sub> and the selected agent where said agent changes the binding affinity of the pRb/E2F<sub>(409-426)</sub> complex under conditions in which pRb and E2F<sub>(409-426)</sub> can form a complex;
- b) determining the three-dimensional atomic coordinates of the supplementary crystal by X-ray diffraction using molecular replacement analysis;
- c) comparing the three dimensional coordinates with those for the crystal structure as ~~claimed in claim 1 characterized by the atomic co-ordinates of Annex 1~~; and
- d) selecting a second generation agent using the three-dimensional atomic coordinates determined for the supplementary crystal.

13. (Currently Amended) [[A]] The method as claimed in of claim 12, wherein said selection selecting is performed in conjunction with computer modeling.

14. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- a) contacting ~~a selected an~~ agent with pRb and E2F<sub>(409-426)</sub> under conditions in which pRb and E2F<sub>(409-426)</sub> can form a complex; and
- b) measuring the binding affinity of pRb to E2F<sub>(409-426)</sub> in the presence of the agent and comparing the binding affinity to that of pRb to E2F<sub>(409-426)</sub> when in the absence of the agent, wherein an agent modulates a pRb/E2F<sub>(409-426)</sub> complex when there is a change in the binding affinity of pRb to E2F<sub>(409-426)</sub> when in the presence of the agent.

15. (Currently Amended) [[A]] The method as claimed in of claim 14, wherein the method further comprising:

- a) growing a supplementary crystal from a solution containing pRb and E2F<sub>(409-426)</sub> and the selected agent wherein said agent changes the binding affinity of the pRb/E2F<sub>(409-426)</sub> complex under conditions in which pRb and E2F<sub>(409-426)</sub> can form a complex;
- b) determining the three-dimensional atomic coordinates of the supplementary crystal by X-ray diffraction using molecular replacement analysis;
- c) comparing the three dimensional coordinates with those for the crystal structure claimed in claim 1 characterized by the atomic co-ordinates of Annex 1; and
- d) selecting a second generation agent using the three-dimensional atomic coordinates determined for the supplementary crystal.

16. (Currently Amended) [[A]] The method as claimed in of claim 15, wherein said selection selecting is performed in conjunction with computer modeling.

17. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- a) —selecting an agent;
- [[b]]a) co-crystallising pRb with the an agent;
- [[c]]b) determining the three dimensional coordinates of the pRb-agent association by X-ray diffraction using molecular replacement analysis; and
- [[d]]c) comparing the three dimensional coordinates with those of the crystal structure claimed in claim 1.

18. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

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- a) ~~selecting an agent;~~
- [[b]]a)      crystallising pRb and soaking ~~the an~~ agent into the crystal;
- [[c]]b)      determining the three dimensional coordinates of the pRb-agent association by X-ray diffraction using molecular replacement analysis; and
- [[d]]c)      comparing the three dimensional coordinates with those of the crystal structure claimed in claim 1.

19. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- a) ~~selecting an agent;~~
- [[b]]a)      co-crystallising pRb, E2F<sub>(409-426)</sub> and ~~the an~~ agent;
- [[c]]b)      determining the three dimensional coordinates of the pRb-E2F-agent association by X-ray diffraction using molecular replacement analysis; and
- [[d]]c)      comparing the three dimensional coordinates with those of the crystal structure claimed in claim 1.

20. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- a) ~~selecting an agent;~~
- [[b]]a)      co-crystallising pRb and E2F<sub>(409-426)</sub> and soaking ~~the an~~ agent into the crystal;
- [[c]]b)      determining the three dimensional coordinates of the pRb-E2F-agent association by X-ray diffraction using molecular replacement analysis; and
- [[d]]c)      comparing the three dimensional coordinates with those of the crystal structure claimed in claim 1.

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21. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 17 to 20,  
wherein the agent is selected using the three dimensional atomic co-ordinates of  
Annex 1.
22. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 17 to 21,  
wherein the methods further comprise comprising selecting a second generation agent  
using the three dimensional atomic coordinates determined in step [[c]]b).
23. (Currently Amended) [[A]] The method as claimed in of claim 22, wherein the  
second generation agent is selected using the three dimensional atomic coordinates of  
Annex 1.
24. (Currently Amended) [[A]] The method as claimed in of claim 22 or 23, wherein the  
selection selecting is performed in conjunction with computer modeling.
25. (Currently Amended) [[A]] The method of identifying an agent as claimed in any one  
of claim[[s]] 3 to 24, wherein the selected identified agent and/or the second  
generation agent mimics a structural feature of E2F<sub>(409-426)</sub>, when said E2F<sub>(409-426)</sub> is  
bound to pRb.
26. (Currently Amended) [[A]] The method as claimed in of claim 9 or 10, wherein  
method comprises the further comprising the steps of:
  - a) contacting the selected agent with a pRb/E2F<sub>(409-426)</sub> complex; and
  - b) determining whether the agent affects the stability of the complex.
27. (Currently Amended) [[A]] The method as claimed in of claim 26, wherein the  
determination determining is with fluorescence polarization.

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28. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- contacting a fluorescently tagged E2F<sub>(409-426)</sub> peptide (E2F-fluoropeptide) with pRb to allow pRb/E2F-fluoropeptide complex formation;
- detecting the fluorescence polarization;
- adding ~~a-selected~~ an agent; and
- detecting the fluorescence polarization in the presence of the agent.

29. (Currently Amended) A method of identifying an agent that modulates a pRb/E2F<sub>(409-426)</sub> complex, comprising:

- contacting a fluorescently tagged E2F<sub>(409-426)</sub> peptide (E2F-fluoropeptide) with pRb to allow pRb/E2F-fluoropeptide complex formation;
- detecting the fluorescence polarization;
- contacting ~~a-selected~~ an agent with pRb and E2F<sub>(409-426)</sub> peptide (E2F-fluoropeptide) under conditions in which pRb and E2F-fluoropeptide can form a complex;
- detecting the fluorescence polarization; and
- comparing the fluorescence polarization detected in b) and d).

30. (Currently Amended) [[A]] The method as claimed in claim 28 or 29, wherein the fluorescently tagged E2F peptide is selected using the three dimensional atomic coordinates of Annex 1.

31. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 28 to 30, wherein a decrease in fluorescence polarization in the presence of the agent indicates that the agent destabilises the complex.

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32. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 28 to 31, wherein the method comprises the further comprising the step of adding untagged E2F<sub>(409-426)</sub> and detecting fluorescence polarization.

33. (Currently Amended) [[A]] The method as claimed in of claim 32, wherein if a decrease in fluorescence polarization decreases, upon addition of the untagged E2F<sub>(409-426)</sub> [[,]] is indicative that the agent does not stabilise the complex.

34. (Currently Amended) [[A]] The method as claimed in of claim 32 or 33, wherein if there is no substantial change in fluorescence polarization[[,]] upon addition of the untagged E2F<sub>(409-426)</sub> [[,]] is indicative that the agent stabilises the complex.

35. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 28 to 34, wherein the method further comprises comprising:

- contacting a fluorescently tagged E7 peptide (E7-fluoropeptide) with pRb to allow pRb/E7-fluoropeptide complex formation;
- detecting the fluorescence polarization;
- adding an agent that modulates pRb/E2F<sub>(409-426)</sub> complex; and
- detecting the fluorescence polarization in the presence of the agent.

36. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 28 to 34, wherein the method further comprises comprising:

- contacting a fluorescently tagged E7 peptide (E7-fluoropeptide) with pRb to allow pRb/E7-fluoropeptide complex formation;
- detecting the fluorescence polarization;

- c) contacting an agent that modulates pRb/E2F<sub>(409-426)</sub> complex with pRb and E7-fluoropeptide under conditions in which pRb and E7-fluoropeptide can form a complex;
- d) detecting the fluorescence polarization; and
- e) comparing the fluorescence polarization detected in b) and d).

37. (Currently Amended) [[A]] The method as claimed in claim 35 or 36, wherein a decrease in fluorescence polarization indicates that the agent also inhibits E7 binding to pRb.

38. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 11 to 16, wherein the binding affinity is measured by isothermal titration calorimetry.

39. (Currently Amended) [[A]] The method as claimed in any one of claim[[s]] 11 to 16, wherein the binding affinity is measured by Surface Plasmon Resonance (SPR).

40. (Currently Amended) An agent, that modulates A method of modulating the interaction between pRb and E2F<sub>(409-426)</sub> comprising[[,]] contacting an agent identified by [[a]] the method as claimed in any one of claim[[s]] 3 to 39 with pRb and E2F<sub>(409-426)</sub> under conditions in which pRb and E2F<sub>(409-426)</sub> form a complex.

41. (Currently Amended) An agent, as claimed in claim 40, for use as an apoptosis promoting factor in A method for the prevention or treatment of proliferative diseases comprising contacting a cell with an agent identified by the method as claimed in claim 3, wherein the agent is an apoptosis promoting factor.

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42. (Currently Amended) ~~An agent as claimed in claim 40 or 41, wherein the agent is for use in A method for preventing or treating cancer, comprising contacting a cancer cell with an agent identified by the method as claimed in claim 3 which may be pancreatic cancer and related diseases.~~
43. (Currently Amended) ~~The use of an agent, A pharmaceutical composition comprising an agent which modulates the formation of a pRb/E2F<sub>(409-426)</sub> complex[[,]] as identified by [[a]] the method as claimed in any one of claims 3 to 39, in the manufacture of a medicament for the prevention or treatment of proliferative diseases.~~
44. (Canceled)
45. (Currently Amended) ~~The method of claim 40, wherein the agent is identified by use of the atomic co-ordinates of Annex 1 the crystal structure as claimed in claim 1 or 2, for identifying an agent that modulates the formation of a pRb/E2F<sub>(409-426)</sub> complex.~~
46. (Original) Computer readable media comprising a data storage material encoded with computer readable data, wherein said computer readable data comprises a set of atomic co-ordinates of the pRb/E2F<sub>(409-426)</sub> crystal structure of Annex 1 recorded thereon.
47. (New) The method of claim 42, wherein the cancer is pancreatic cancer.